

# Chronic Rhinosinusitis and Its Impact on Pregnancy

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**Abstract**— Nasal congestion is the most common symptom of pregnancy rhinitis, which disappears once the baby is born. Pregnant patients with rhinitis report symptoms in 18 to 30 percent of cases. As a result, pregnant rhinitis may have a negative impact on the pregnancy and may result in obstructive sleep apnea, which may have an adverse effect on the outcome of the pregnancy. Previous studies on the prevalence of pregnant rhinitis at various stages of pregnancy have come up with conflicting results. The purpose of this study was to investigate the prevalence of rhinosinusitis during various stages of pregnancy.

At a private hospital in the Kurdistan area of Iraq, a cross-sectional observation study of patients in the second and third trimesters of pregnancy was undertaken using the 22-item Sino-Nasal Outcome Test (SNOT-22). The participants were women in their second and third trimesters of pregnancy. The study comprised 76 patients who were considered to be at low risk of becoming pregnant. Thirty-two patients were in their second trimester of pregnancy and 44 patients were in their third trimester of pregnancy when the study was conducted.

When comparing the third trimester to the second trimester, the average item scores for the complete questionnaire were considerably higher ( $P$  value = 0.041), indicating a more severe deterioration of cognitive function. In both the second and third trimesters, a comparison between women with and without preexisting allergic rhinitis reveals that the allergic group has significantly higher SNOT-22 scores ( $P$  value = 0.007). In individuals with rhinosinusitis, the risk of miscarriage was reduced in the third trimester ( $P$  value = 0.011).

Rhinosinusitis is less common in the third trimester of pregnancy when compared to the second trimester, as well as when compared to patients who do not have rhinosinusitis in the first place.

**Keywords**— Chronic Rhinosinusitis, Pregnancy, Erbil, Kurdistan Region of Iraq.

## I. INTRODUCTION

Pregnancy rhinitis develops as nasal congestion without the presence of other indicators of a respiratory tract illness and without a known allergic etiology, with symptoms completely disappearing after birth. The prevalence of rhinitis and sinusitis during pregnancy is 18–30 percent, with this percentage likely to be higher in women who had a history of allergic rhinitis prior to becoming pregnant (Philpott et al. 2019). Pregnancy-related rhinosinusitis is not always a non-life-threatening medical condition (Turgunova, 2021). In severe cases, unmanaged upper airway illness can cause pregnancy

complications, exacerbate coexisting asthma, and even cause snoring or sleep apnea, according to the American Academy of Pediatrics (Mullol et al. 2020).

Previous studies on the prevalence of pregnant rhinitis at various stages of pregnancy have been inconclusive and even inconsistent in their conclusions (Wongkaewkhaw et al. 2020).

Despite the fact that this is a widespread condition, it has received little attention and is, in our opinion, deserving of more study and research (Baudoin et al. 2021).

The Sino-Nasal Outcome Test (SNOT-22) score, which consists of 22 items, is a health-related assessment for

rhinosinusitis. The SNOT-22 is being used in this study to examine rhinosinusitis, which is a health-related condition that occurs during pregnancy (Neagos et al. 2021). The goal of this study was to determine the SNOT-22 scores at various stages of pregnancy. Our hypothesis was based on clinical experience and previously published data, and we predicted that the biggest decline in would occur during the last stages of pregnancy (Macias-Valle & Psaltis, 2020).

A validated rhinosinusitis instrument was used in this study to measure the prevalence of rhinitis symptoms in a cohort of pregnant women in their second and third trimesters of pregnancy (Nyaiteera et al. 2018). This is the first time that this has been done (Numata et al. 2019).

## II. METHODS

A cross-sectional observation study of low-risk pregnant patients who attended an obstetric clinic at a private hospital in Iraq's Kurdistan region was conducted over a 2-month period at a private hospital in the Kurdistan region. "18 years of age, nasal surgery in the past or a candidate for nasal surgery (excluding cosmetic rhinoplasty), antibiotic treatment during the previous 2 weeks, topical or systemic steroid treatment during the previous 2 weeks, or chronic rhinosinusitis with or without nasal polyps were all excluded from the study.

During the research period, every patient in the clinic was solicited for their consent to participate. The study was open to everyone who met the inclusion criteria and did not satisfy the exclusion criteria, and they were all required to sign informed permission before participating.

Researchers employed the SNOT-22 to assess rhinosinusitis-specific, health-related symptoms in the study participants. Patients gave their opinions on the 22 various symptoms connected to both nose and overall well-being. The following is a list of nasal disorder symptoms as well as the social and emotional implications of nasal disorder. The patients were asked to score their issues based on how they had been feeling for the previous two weeks prior to completing the survey questionnaire. In addition, the patients were asked to list up to five items that had the greatest impact on their health.

The typical SNOT-22 readings for persons denying symptoms of rhinosinusitis and who have not previously been diagnosed with rhinosinusitis have been defined in prior research. These values were utilized to make a comparison between the study population and the rest of the world. According to the combined results of these research, the overall SNOT average item value was 0.6328, with an associated standard deviation of 0.528, and the standard deviation was 0.6388.

The study was accepted by the Institutional Ethics Board at a private hospital in Iraq's Kurdistan region, which was a first for the country.

## III. ANALYSIS

When it comes to monitoring sinonasal symptoms, the Clinical Outcomes Research Office of the Department of Otolaryngology, Head and Neck Surgery at Washington University School of Medicine devised this instrument. The results of a principal components factor analysis with varimax rotation revealed five factors that explained 68.2 percent of the variance: Questions 1–8 asked about nasal symptoms; questions 9 and 11 asked about ear symptoms; questions 10 and 12 asked about head symptoms, such as dizziness; questions 13–17 asked about sleep symptoms, such as waking up in the middle of the night; and questions 18–22 asked about feelings, such as "sad." Questions 18–22 asked about feelings, such as "sad." Additional internal reliability tests (Cronbach's!) were performed for each factor, with the results as follows: (a) nasal symptoms,! 0.6; (b) ear symptoms,! 0.6; (c) head symptoms,! 0.0; (d) sleep symptoms, 0.1; and (e) feelings, 0.0. The results of the internal reliability tests were as follows: The mean score of the symptoms was determined for each factor, and the means between the second and third trimesters were compared using a t-test to see if there was any difference. Previous research has demonstrated that the SNOT! 22-item Sino-Nasal Outcome Test is effective. The split of the SNOT questionnaire into several domains is both methodologically valid and clinically useful in terms of clinical significance. Aside from that, mean symptoms scores were compared between women in both trimesters who had allergic rhinitis and those who did not have allergic rhinitis, as well as between women in both trimesters and patients with nonrhinosinusitis.

Table 1 Questionnaire

Variable	2 <sup>nd</sup> Trimester		3 <sup>rd</sup> Trimester		P-value
	Mean	Standard deviation	Mean	Standard deviation	
Feelings	0.941	0.903	1.294	0.843	0.041
Sleep	1.592	1.433	2.343	1.251	0.007

Head	0.432	0.613	0.581	0.832	0.180
Ear	0.102	0.312	0.351	0.743	0.022
Nasal	0.571	0.752	0.693	0.783	.0253
Total SNOT	0.832	0.661	1.161	0.743	0.041

Table 2 Symptoms

Symptom	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Frustrated/Restless	20	22.5	69	77.5
Reduced productivity	26	29.2	63	70.8
Difficulty falling asleep	26	29.2	63	70.8
Lack of sleep	29	32.6	60	67.4
Feeling tired	36	40.4	53	59.6
Fatigue	42	47.2	47	52.8

Table 3 pregnant women participating with/without allergic rhinitis

Items	With Allergic		Without Allergic		P-Value
	Mean	Standard deviation	Mean	Standard deviation	
Feelings	1.411	1.023	1.022	0.811	0.009
Sleep	2.344	1.432	1.881	1.342	0.092
Head	.0951	0.962	0.341	0.561	0.005
Ear	0.301	0.632	0.223	0.591	0.299
Nasal	1.011	0.812	0.491	0.71	0.003
Total SNOT	1.331	0.772	0.892	0.663	0.007

#### IV. RESULTS

76 patients were enrolled in the trial for a total of 76 participants. Three hundred and twenty-two patients (42.1 percent) were in the second trimester of their pregnancy, with an average age of 31.34 years. Forty-four patients (57.9% of the total) were in their third trimester of pregnancy, with an average age of 31.2 years among them. Neither group had any smokers, and the number of smokers in both groups was insignificant. One lady reported smoking 5 cigarettes per day during the second trimester, whereas another woman reported smoking 10–15 cigarettes per day during the second trimester. Nonsmokers made up the majority of the remaining 30 ladies. One lady reported smoking 1 cigarette per week during the third trimester, whereas another woman claimed smoking 4 cigarettes per day during the third trimester. The remaining 42 women were nonsmokers, according to the data.

It was found that the mean SNOT-22 item scores for the full questionnaire were 0.83 for the second trimester and 1.16 for the third trimester (P-value = 0.041), indicating that the third trimester was associated with more severe impairment of, as opposed to the second trimester. Our next step was to categorize the results of the SNOT-22 into five groups: nose symptoms (questions 1–8), ear symptoms (questions 9 and 11), head symptoms (questions 10 and 12), sleep symptoms (questions 13–17), and feelings (questions 18–22). The mean item scores for each category were calculated, and the findings for the complete questionnaire are shown in Table 1 along with the results for the entire questionnaire. When compared to the second trimester, the third trimester indicates a more significant deterioration of the fetal development. It was also shown that average item ratings for the ear, sleep, and mood categories were significantly higher during the third trimester (P-value 0.022, 0.007, and 0.04, respectively).

During the survey, patients were asked to list up to five items that had the greatest impact on their health. Table 2 illustrates the frequency of the seven most frequently mentioned items by patients who identified them as one of the five factors that had the greatest impact on their health. All of the most commonly cited topics had something to do with sleep. In both the second and third trimesters, a comparison comparing women with and without preexisting allergic rhinitis reveals that the allergic group has considerably higher SNOT-22 scores than the nonallergic group (P-value 0.007; Table 3).

A comparison of normal SNOT-22 values for nonrhinosinusitis patients and this study cohort showed that rhinosinusitis-specific was much lower in the third trimester when compared to normal values. This is consistent with the findings of other studies (1.16 and 0.6328, respectively; P-value 0.011). Between women in their second trimester of pregnancy and individuals with non-rhinosinusitis, there was no statistically significant difference (0.83 and 0.6328, respectively; P-value 0.30).

## V. DISCUSSION

The SNOT-22 was used by the researchers to assess whether rhinosinusitis was less common in the third trimester of pregnancy when compared to the second trimester and when compared to patients who did not have rhinosinusitis in the first place. Our findings clearly support our hypothesis, demonstrating that the incidence of rhinosinusitis in the third trimester of pregnancy is significantly lower than in the second trimester and in individuals with nonrhinosinusitis. Previous research has not been able to reach a definitive conclusion about the severity of nasal congestion and the resulting loss of during the various phases of pregnancy. Pregnancy rhinitis has been defined as a condition that manifests itself at the conclusion of the first trimester and subsides following the birth of the child in question. Another study discovered that nasal congestion in pregnant women increased considerably only during the third trimester, when compared to nonpregnant women who were tested. Ellegard and colleagues discovered that women were more congested during pregnancy than they were after pregnancy. Early pregnancy (15–18 weeks) and late pregnancy (the last month before delivery) were compared, and it was discovered that late pregnancy had a tendency to have more severe nasal congestion. According to the findings of Sobol et al., first-trimester pregnancy is not related with an increased prevalence or severity of nasal symptomatology as compared to nonpregnant women of reproductive age in the study population. Pregnancy rhinitis was discovered in 599 pregnant women who

participated in a questionnaire study between the ages of 7 and 36 weeks. Bende and Gredmark discovered that self-reported nasal stuffiness increased during pregnancy, occurring in 27 percent of women at 12 weeks of gestation, 37 percent at 20 weeks, 40 percent at 30 weeks, and 42 percent at 36 weeks of gestation, according to their findings. A validated rhinosinusitis-specific tool was not used in any of these investigations to assess the prevalence of rhinitis symptoms in participants.

The SNOT-22 score was designed as a rhinosinusitis-associated health-related questionnaire that incorporates symptoms linked to the nose as well as symptoms connected to overall health. In addition to being simple for patients to complete, the SNOT-22 questionnaire can be utilized in everyday clinical practice. The response of individual patients to specific therapies can be monitored over time by tracking them longitudinally. Patients describe their disease-specific health status by indicating the severity of rhinosinusitis symptoms, and they describe their importance across different domains, including the physical problems, functional limitations, and emotional consequences of rhinosinusitis, as well as their overall health status. A reliable, valid, and responsive diseasespecific, health-related measure for patients with rhinosinusitis has been established, and the SNOT-22 has been shown to be such.

The cause of pregnancy-related rhinitis is currently unknown. According to the available research, high serum levels of estrogen, progesterone, prolactin, or neuropeptides such as vasoactive intestinal polypeptide or substance P do not result in nasal congestion. Patients with pregnancy rhinitis had significantly higher amounts of placental growth hormone in their blood than those without the condition.

The results of the different categories of questions reveal that the sleep-related symptoms make up the majority of the contribution to the lower scores. All of the items that were most frequently indicated as having the greatest impact on health were sleep-related. When in the supine posture, nasal congestion increases, which is especially true for those suffering from rhinitis. For a variety of reasons, snoring and sleep apnea are exacerbated in the supine posture. In a study of 502 women conducted the day after delivery, habitual snoring was noted by 23 percent of those who had done so the previous week. 18 Snoring on a regular basis has been demonstrated to be connected with high blood pressure, regardless of body mass index. Snoring and sleep apnea are both related with increased nocturnal blood pressure, which is a feature of preeclampsia-induced hypertension. In one study, it was discovered that those who snore had much greater rates of



hypertension, preeclampsia, and intrauterine development retardation, and that the Apgar scores of their newborns were poorer as well.

Women with preexisting allergic rhinitis have reduced rates of rhinosinusitis during the second and third trimesters of pregnancy as compared to pregnant women without allergic rhinitis, according to our findings. A considerable proportion of pregnant women who suffer from rhinitis are allergic to anything. Pregnant women with documented allergies are more likely than nonpregnant women to experience worsening allergic symptoms during their pregnancy, with symptoms returning to their pre-pregnancy levels following delivery (10–30 percent). Due to the possibility of coexistence, it may be difficult to distinguish between allergic and pregnant rhinitis in some cases. It is possible that allergic rhinitis will be accompanied with symptoms such as watery discharge and sneezing that are not typical of pregnant rhinitis. Specific IgE antibodies can be detected in the blood and used to confirm or rule out allergies. The most effective method is to avoid allergens, and allergy consulting can be beneficial in identifying potentially harmful allergens.

When making decisions on the management of pregnant rhinitis, it is important to take into account all of the therapeutic risks, advantages, and alternatives. Before any operation may be carried out, the pregnant patient must be fully informed of the procedure and give her consent to it. Many women and their caregivers may be reluctant to seek medical treatment for pregnant rhinitis due to concerns about teratogenicity. There is a substantial quantity of medical research that refutes these myths, particularly during the first trimester of pregnancy. Due to the fact that we have demonstrated, pregnant rhinitis is more common throughout late pregnancy and can be treated safely in many cases. Realize that inadequate treatment of the mother may be more detrimental to the unborn child than the treatment that is being advocated. Everyone who is expecting should get information about pregnancy rhinitis at their antenatal care appointments. Having the understanding that nasal congestion is a common and self-limiting disease may provide some consolation to patients. Raising the head of the bed by 30 degrees can help to reduce nasal resistance and congestion. A light to moderate amount of exercise has a decongestant impact on the nasal mucosa, and the usual exhaustion that follows exercise can help you sleep better at night. In the treatment of pregnant rhinitis, nasal washings with physiological saline solution are useful in alleviating symptoms. Nasal topical decongestants provide effective temporary relief, and as a result, they are frequently overused by women suffering from pregnant rhinitis. If this occurs, it may

result in rhinitis medicamentosa, which, unlike pregnant rhinitis, does not resolve on its own following delivery. Nasal decongestants should not be taken for three to five consecutive days after the third day. In a placebo-controlled, randomized, double-blind research, it was discovered that topical nasal corticosteroids were ineffective in the treatment of pregnancy-induced rhinitis. Data on intranasal budesonide medication during pregnancy, however, is scarce, and it has been found to be safe during this time period. Based on the shown efficacy of intranasal steroids in the treatment of allergic rhinitis, nonallergic rhinitis, and nasal polyps, it is reasonable to provide such medication as necessary in the treatment of pregnant rhinitis.

Pregnant women spend the majority of their time in touch with their obstetricians, who may be unaware of the existence of sinonasal issues. It is possible that increased knowledge and effective treatment may not only improve the well-being of pregnant patients, but will also have a positive impact on the outcome of the pregnancy.

## VI. CONCLUSIONS

A validated rhinosinusitis instrument was used in this study to measure the prevalence of rhinitis symptoms in a cohort of pregnant women in their second and third trimesters of pregnancy. This is the first time that this has been done. The incidence of rhinosinusitis was observed to be decreased in the third trimester of pregnancy when compared to the second trimester of pregnancy, as well as when compared to patients who did not have rhinosinusitis. The primary contributor to the decrease was the presence of sleep-related problems. Snoring and Obstructive Sleep Apnea, which are both sleep-related respiratory abnormalities, can have a negative impact on the outcome of a pregnancy. The incidence of rhinosinusitis during the second and third trimesters of pregnancy was lower in women with preexisting allergic rhinitis than in women who did not have allergic rhinitis before becoming pregnant. When medically necessary, pregnancy rhinitis can be safely treated with antihistamines. Increasing awareness of this serious illness among obstetricians and their patients is necessary.

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